

Representing Patterns



Focus On ...

In this lesson, I will learn to

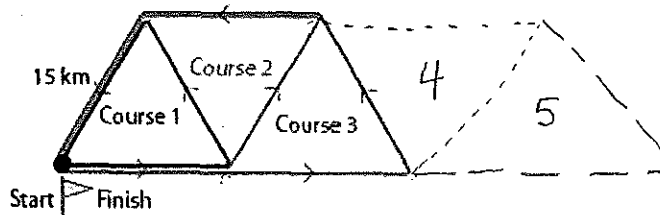
- distinguish between an expression and an equation
- represent pictorial and written patterns with linear equations
- describe situations that represent given linear equations
- solve problems that involve pictorial and written patterns using a linear equation
- verify linear equations by substituting values



Explore and Analyze

A skiff is a two-person sailing boat that can be used for racing. The carbon foam hull and multiple sails allow the boat to travel at speeds of 5 to 35 knots.

1 knot \approx 1.852 km/h



The diagram shows the first three racing courses for a class of skiffs. Each leg of the course is 15 km.

What do you think the next two courses might look like?

1. How could you determine the total distance of each racing course?

The race course length increases by 15 km with each course #

course #, n	d, (km)
1	45
2	60
3	75
4	90
5	105

$$d = 15n + 30$$

2. Assuming the pattern continues, what is the length of Course 9? Compare your strategy with a classmate's. Which strategy do you prefer? Explain why.

$$d = 15(9) + 30$$

$$d = 135 + 30$$

$$d = 165$$

could make a graph!!

3. a) Determine which course is 135 km long.

$$135 = 15n + 30$$

b) Determine the length of Course 23.

$$d = 15(23) + 30$$

c) How did you determine the answers to parts a) and b)? ~ SUBSTITUTION

$$135 = 15n + 30$$

$$\frac{105}{15} = \frac{15n}{15}$$

$$7 = n$$

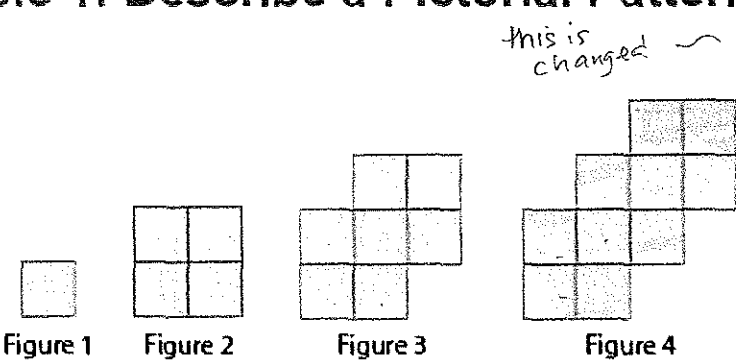
$$d = 15(23) + 30$$

$$d = 345 + 30$$

$$d = 375$$

changes as result of other variables

Example 1: Describe a Pictorial Pattern Using an Expression



this is changed ~ independent ~ x y ~ dependent

figure #, n	squares, S
1	1
2	4
3	7
4	10
5	13
6	16

a) Describe how the pattern grows. - grows by 3 each time!

b) Create a table of values to represent the relationship between the number of squares and the figure number for the first four figures.

c) Write an expression and an equation to represent this pattern. ~ $3n - 2$

$$S = 3n - 2$$

d) How many squares are in the 12th figure?

e) Which figure number has 106 squares? Verify your answer.

Can you verify your answer in more than one way?

$$S = 3f - 2$$

$$S = 3(12) - 2$$

$$S = 36 - 2$$

$$S = 34$$

$$106 = 3f - 2$$

$$\frac{108}{3} = \frac{3f}{3}$$

$$36 = f$$

harder equation $S = 3(x-1) + 1$